

## ABSTRACT

Knee prostheses featuring components that more faithfully replicate the structure and function of the human knee joint in order to provide, among other benefits: greater flexion of the knee in a more natural way by promoting or at least  
5 accommodating internal tibial rotation in a controlled way, replication of the natural screw home mechanism, and controlled articulation of the tibia and femur respective to each other in a more natural way. In a preferred embodiment, such prostheses include an insert component disposed between a femoral component and a tibial component, the insert component preferably featuring among other things a  
10 reversely contoured postereolateral bearing surface that helps impart internal rotation to the tibia as the knee flexes. Other surfaces can also be specially shaped to achieve similar results, preferably using iterative automated techniques that allow testing and iterative design taking into account a manageable set of major forces acting on the knee during normal functioning, together with information that is known  
15 about natural knee joint kinetics and kinematics.